

## Dr. Airy's Report to the Local Government Board on the Sanitary State of the Knighton Registration District (Radnorshire).

EDWARD C. SEATON, M.D.,

*Medical Department,*

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In the last quarter of 1871, and again in the first quarter of 1874, the number of deaths from "fever" returned to the Registrar-General as having been registered in the Knighton Sub-district of the Knighton Registration District, gave occasion for inquiry from the Local Government Board, addressed to the Guardians of the Knighton Union, as to the sanitary condition of the places where deaths from fever had occurred. The replies received, together with the reports of the Medical Officers of Health, showed that there was great need of improvement in the country villages and hamlets, especially as regards water supply, drainage, privy accommodation, and protection of dwellings from damp. Repeated inquiries in subsequent years elicited little information of a satisfactory kind, and further official reports showed that little real improvement had been made. Under these circumstances the Board ordered a medical inspection of the Knighton Rural Sanitary District to be made.

Occasion of inquiry.

I have the honour to report that, in accordance with instructions received from the Board, I visited Knighton on January 23-30, 1878. Inasmuch as the quarterly returns of deaths for the Knighton Registration Sub-district, as published by the Registrar-General, included the deaths in the Knighton Urban District, it appeared desirable that my inspection should also include the urban district, and I received the Board's instructions to extend my inquiry accordingly. The inspection thus embraced the whole of the Knighton Registration District.

The Knighton Registration District, as constituted previous to the 1st of July 1877, consisted of the two sub-districts of Knighton and Llanbister, and had an area of 101,095 acres, and a population in 1861 of 10,379, and in 1871 of 10,323. On the 25th of March 1877, the former Presteigne Union was dissolved; part of it was added to the Kington Union (Herefordshire), and part to the Knighton Union (Radnorshire). This recent addition to the Knighton Union forms a separate sub-district (Presteigne) for registration purposes. It has an area of 14,625 acres, and had in 1871 a population of 2,607. The Knighton Registration District, therefore, as newly constituted, has an area of 115,720 acres, and a population which in 1871 numbered 12,930. The employment of the people is almost entirely agricultural. Knighton and Presteigne are the only towns in the district, and they contain no manufactures of importance.

General description.

The Knighton Union lies principally in the county of Radnor, but also includes a long strip of Shropshire skirting the north-eastern bank of the River Teme, and a small corner of Herefordshire in the eastern part of the Union. The general character of the district is rough and mountainous. A range of bold, but not craggy, hills of the Silurian formation, nearly 2,000 feet high, extends throughout from Radnor Forest in the south to the Kerry Hill in the north. On the west side of this range, the River Ithon, with its tributaries, runs from north to south, afterwards turning to the west to join the Wye between Rhayader and Builth; on the east side of the range the head streams of the Teme and the Lugg take their rise (the former in the northern the latter in the southern hills), and flow nearly parallel to one another in a south-easterly direction, but subsequently diverge, the Teme falling into the Severn below Worcester, and the Lugg joining the Wye below Hereford. Where the valley of the Teme opens out from the Welsh hills into the plains of Herefordshire, and also in the valley of the Lugg about Presteigne, there is a large extent of fertile arable land and pasture, but higher up the country, in the narrow valleys, agriculture is carried on with difficulty. It is true the friable character of the rock invites tillage to a great height up the hill-sides, but the soil is poor and the labour required is great. Much industry is shown in the careful irrigation of every slope of meadow land in the valleys. In accordance with these difficult conditions of livelihood, the hill-side peasantry are a thrifty, hard-living race, knowing nothing of the luxuries, little of the comforts, and not much of the decencies and ordinary sanitary requirements of human life. The little they demand in the way of sanitary provision has long been denied them, and until very recently the local authority have done little or nothing to help them.

Statistics of mortality.

In the accompanying Tables (I. and II.) I have given summaries of the deaths from all causes, and of deaths from seven principal diseases of the zymotic class, taken from the Registrar-General's Quarterly Returns from 1870 to 30th June 1877, for the former Presteigne Registration District and for the two registration sub-districts (Knighton and Llanbister) of the Knighton Union.

It must be remembered that the present Knighton Union includes only a part of the old Presteigne Union, and therefore the returns relating to the Presteigne District in these tables do not belong precisely to the new Presteigne Sub-district, though they serve as a fair index of the average rate of mortality there. Again, the returns for the Knighton Sub-district include all deaths in the Knighton Urban District, and therefore do not precisely represent the mortality in the rural portion. The returns for the Llanbister Sub-district are exclusively rural.

TABLE I.—DEATHS from all CAUSES.

Year.	Presteigne District.	Knighton Sub-district.	Llanbister Sub-district.
Estimated population in 1873 -	3,900	6,000	4,360
1870 - - - -	75	122	79
1871 - - - -	62	126	62
1872 - - - -	57	102	71
1873 - - - -	53	100	56
1874 - - - -	51	97	73
1875 - - - -	70	112	68
1876 - - - -	56	106	84
1877 to June 30 - -	38	72	37
Average per annum - -	61·6	111·6	70·7
Average death-rate per 1,000 per annum.	15·8	18·6	16·2

TABLE II.—DEATHS from SEVEN ZYMOTIC DISEASES.

Year.	Small-pox.			Measles.			Scarlatina.			Diphtheria.			Whooping Cough.			Fever.			Diarrhœa.		
	P.*	K.	Ll.	P.	K.	Ll.	P.	K.	Ll.	P.	K.	Ll.	P.	K.	Ll.	P.	K.	Ll.	P.	K.	Ll.
1870 - - - -	-	-	-	1	-	-	-	5	1	1	1	1	-	-	-	1	3	7	-	1	-
1871 - - - -	-	-	-	-	-	-	1	12	3	-	-	-	-	-	-	-	9	-	-	2	-
1872 - - - -	-	-	1	1	-	-	1	-	4	-	2	-	1	2	1	2	3	3	1	3	2
1873 - - - -	-	-	-	-	-	-	1	-	-	-	1	-	-	2	-	-	2	3	-	2	3
1874 - - - -	-	-	-	-	1	-	2	2	5	-	1	-	-	2	-	-	5	3	-	2	-
1875 - - - -	-	-	-	-	2	3	3	1	4	1	-	1	3	-	-	4	3	3	-	-	-
1876 - - - -	-	-	-	-	2	-	-	2	1	-	3	-	-	2	8	1	2	6	3	-	-
1877 to June 30	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	2	-	1	2	-
Average death rate per 1000 per annum.							0·30	0·50	0·55		0·16		0·24			0·14	0·66	0·76	0·26	0·26	0·15

The rate of mortality from all causes is decidedly low in the Presteigne District, somewhat higher in the Llanbister Sub-district, and higher still in the Knighton Sub-district, which includes the town of Knighton. After allowance has been made for the proportion of this mortality which is due to the town of Knighton, it appears that the death-rate in the Knighton part of the rural district has been by no means high. For sake of comparison it may be mentioned that the average death-rate during the same period in the country districts of England and Wales in general has been about 19 per 1,000.

While, however, the total mortality from all causes in the Knighton district has been rather low, it must be noticed that the mortality from fever has been decidedly high. In the Knighton Sub-district the fever death-rate during the seven years 1870-7 exceeded by one-half, and in the Llanbister Sub-district it has been nearly double, that for the country at large. It appears from these figures that while the general condi-

\* P.—Presteigne District. K.—Knighton Sub-district. Ll.—Llanbister Sub-district.



tions of climate and occupation are favourable to life, they are partly neutralized by special conditions encouraging prevalence of fever. I must also point to the mortality from scarlet fever, diphtheria, whooping cough, and diarrhœa in the Knighton Sub-district; to that from scarlet fever in the Llanbister Sub-district; and to that from diarrhœa in the Presteigne District, as being higher than might be expected in a wholesome country region.

I will now proceed to consider the Rural and Urban Districts separately.

#### KNIGHTON RURAL SANITARY DISTRICT.

This comprises the whole Union, with the exception of the contributory parliamentary borough of Knighton, which forms an urban sanitary district. By the addition in 1877 of part of the former Presteigne Union (as already mentioned) the Knighton Rural Sanitary District has been considerably enlarged in area, and has received an accession of 2,607 to its former population of 8,580. Within the present limits of the district, the population in 1871 was 11,187, in 1861 it was 11,177. Since the last census the population has more probably diminished than increased, for many houses are standing empty in Presteigne, and the rural population generally is falling off. Description.

The Rural Sanitary Authority are the Board of Guardians of the Knighton Union. They meet once a fortnight. For purposes of sanitary supervision they have divided the district into three parts—(1) Beguildy and Llanbister, (2) Knighton and Brampton Bryan, (3) Presteigne. The first two comprise the whole of the district as it was prior to July 1877; but they do not correspond to the Llanbister and Knighton Registration Sub-districts. The third includes the whole of the portion recently added to the union, and corresponds to the new Presteigne Registration Sub-district.

The Medical Officers of Health (under the Order of the Board, 11th November 1872) for the above-named three divisions of the rural sanitary district are (1) C. J. Covernton, Esq., at a salary of 35*l.*; (2) H. O. Brown, Esq., at a salary of 20*l.*; (3) W. Hanson, Esq., at a salary of 20*l.* For the whole rural district as it was before July 1877, the office of Inspector of Nuisances is held (at a salary of 40*l.*) by Mr. T. Gough, who was appointed in April 1875. An additional Inspector, Mr. J. Mackenzie, has been appointed to the new Presteigne division, at a salary of 15*l.*

The Knighton Rural Authority have not applied for any urban powers, nor have they framed any byelaws for their district.

I have already described the main features of the district and the character of the population. With the exception of the town of Presteigne, there is no parish or township in the district containing more than 1,000 persons. Besides Presteigne, there are 28 parishes and townships, with an average of 331 inhabitants to each. Part of this population is gathered in little villages which lie along the course of the principal streams; the remainder are scattered in hamlets and farmsteads and single cottages up in the dingles and among the hills.

The older and poorer dwellings, whether in the plain or among the hills, are usually walled with clay and wattle-work in a strong frame of timber. In exposed situations the clay walls are often seen faced with planks stretched horizontally and overlapping one another, so as to shed the rain, but it is very rare to find any protection against the soaking of rain water at the foot of the wall. The shaly rock found in the district affords poor building stone, except at certain spots where it is quarried for the better class of buildings. It is usual, however, even in the poorest cottage, to build the chimney stack of stone, and this is often the most substantial part of the whole structure, and encloses a very large low-browed fireplace. The roof is usually of thatch, and when carefully laid will last without need of repair for eight or nine years; at the end of that time, unless the thatch is entirely renewed, its partial renewal becomes a regular annual duty, which should be performed in autumn to meet the needs of winter. On one of the largest estates in the union the landlord, or rather the landlord's agent, requires his tenants themselves to keep the thatch in good repair. The duty (whose ever it is) is often neglected, or very imperfectly performed. Dwellings.

I must make special mention of a small farm-house, once a good one, called Lower Cott. The thatch has rotted and fallen into the bedroom, leaving holes that a man could get through. The rain comes through in numberless places, blackening the walls with the stain from the sodden thatch and flooding the room below. The rafters are broken or rotted from the walls; cloths and matting are hung tentwise, to shelter the tenants of two beds in this room.

Outside all is filth and ruin. Pigs wallow in the roofless back kitchen, and the refuse of the house is thrown at large before the door.

A notice was served on the owner in November 1877, requiring him to repair the roof. The case was again reported to the Sanitary Authority in January 1878. No further order was made.



A cottage of the poorest class has only one bedroom for the whole family, either on the ground floor, which is often bare clay, or immediately beneath the thatch, with the rafters springing from within a foot of the floor. The bedroom window has an area of only two or three square feet, and is not always made to open. Even when made to open it is usually kept shut. In the narrow valleys the majority of the houses are built on the slope of the hill side, with their back or end walls against the damp earth; consequently dampness of walls and floors is of very frequent occurrence. It seems a favourite position for a house to be backed against the bank of a dominant churchyard. I noticed this at Llanbister, Llanbadarnfynydd, and Beguildy.

Until recently, eaves-troughing was almost unknown, not being very suitable for thatched roofs projecting far from the walls; but in the last few years many of the old thatched roofs have been replaced by slate or stone projecting only a few inches beyond the wall; and the need has arisen for troughing to carry off the rain. This is still one of the great wants of the district, and is the more important because the average rainfall in these parts is very considerable.

Privies. &c.

Five years ago privies were rare in the Welsh part of the district, though more common in the English villages. Much has been done since then in supplying this defect, but still a large number of the upland cottages have no provision of this kind, and there results constant danger to the purity of the open rills which flow near these ill-provided dwellings. Where privies exist, they are often placed in offensive proximity to the houses. They are emptied (if at all) by the tenants, with or without notice from the Inspector of Nuisances, and the stuff is more often simply buried than used as manure, the latter use being little understood in this part of the country.

The arrangements for carrying off slop and surface water are generally imperfect; sometimes slops are thrown out on the ground near the house, or into a convenient ditch; sometimes there is a drain to convey them towards the nearest stream.

In Llanbister a streamlet is allowed to flood a footpath and a backyard and a public road.

Farmyards are very filthily kept, and their drainage is allowed to flow on to public roads in Bucknell and other places.

Pigs are habitually kept close to human habitations. The pigstye floor is rudely and roughly paved, and little care is used in keeping it clean. It becomes a slough of filth.

Water supply.

Ample supplies of the purest water offer themselves at countless springs and rivulets on the hill sides, but little care is taken to secure them from pollution. In several well ascertained cases these streams have been the vehicle by which the poison of enteric fever has been conveyed from one family to another.

One such case occurred in 1874 at a place called Gwerncrin. Here is a stream running past a farm house on one side, and, lower down, past a cottage on the other side. At the farm house a man who was known to have had communication with a person in another village suffering from enteric fever was himself taken ill with enteric fever and died. His stools are believed to have been buried, but there is no doubt that the vessels that had been used in the sick room were washed out in the brook that flowed past the farm. About twenty yards lower down is the spot where the dwellers in the cottage draw water for all purposes from this same brook. A fortnight after the death of the man at the farm, enteric fever attacked one of the family at the cottage, and subsequently all the rest of the family. In like manner at Llanbadarnfynydd in 1870, at Lloyney in 1871, at Beguildy in 1873, there was reason to believe that the spread of enteric fever was due to pollution of the drinking water.

In the English plain, in the eastern part of the district, water is obtained principally from wells. Several of those at Bucknell and elsewhere are in dangerous proximity to privies. Pure water could probably be brought into Bucknell from a spring above the village.

Presteigne.

The town of Presteigne, which has lately been brought into the Knighton Rural Sanitary District, requires separate notice. It was at one time the chief town in Radnorshire, and was much more extensive and populous than at the present time. It was severely visited by the Plague two centuries ago, and has never recovered from that disaster. The population of the township was 1,603 in 1861, and 1,713 in 1871. At the present time it is said to be decreasing, and a large number of houses are standing unoccupied.

The present Medical Officer of Health for this part of the Knighton Rural Sanitary District, W. Hanson, Esq., had held the same office under the Guardians of the Presteigne Union from 1874, and is intimately acquainted with the sanitary condition of the place.

The mortality of the town in recent years has not been so great as might have been expected when the neglect of its sanitary condition is observed. Assuming the population



to have remained stationary since 1871, the death-rate in 1875 was 18·7 per 1,000 living, in 1876 it was 16·3, in 1877 it was 15·7. The mortality from fever has been low, but there have been several deaths from scarlet fever and diarrhœa.

Presteigne stands on the right or southern bank of the River Lugg, on ground sloping evenly and not steeply from the foot of the southern hills to the river's brink, and consists mainly of a long street (Hereford Street) nearly parallel to the river, and a shorter street (Broad Street) at right angles to the first and leading to a bridge over the river. Besides these there are one or two smaller back streets. Water is obtained almost entirely from shallow wells sunk in the many-fissured porous shale, the strata of which slope towards the river at about the same degree of inclination as the slope of the surface. These wells, it appears, are not fed by deep springs, but by water from the more superficial layers of the rock, for when certain upper meadows are under copious irrigation it is found that the water rises rapidly in the wells. There is no doubt that surface filth can and does enter these wells in large quantities. The town is full of common privies with leaky cesspits. In wet weather the cesspits are brimming with rain-diluted filth; in dry weather they rapidly fall to their former level; the liquid filth can only have sunk into the porous soil, whence it must drain into the wells. As a matter of fact, the water of many of the wells, on analysis, gives evidence of large pollution by sewage. There are in the town those who are well satisfied with the water from particular wells which chance to be less polluted than others, or in which perhaps the polluting matter is more completely oxidised, but, on the other hand, the complaints of the badness of the water are numerous.

In 1874, Mr. Hanson tells me, eight cases of fever, apparently of a typhoid character, occurred in Broad Street among persons who drank water from a public pump in the street. The water on analysis was found to be polluted with sewage. The pump is at present out of order, but has been in use up to a recent date.

Again, the town has no sewers, except one old drain carried down one of the side streets towards the river. House-slops go to swell the contents of the mixens and cesspits. Here and there they leak away along shallow channels to the roadside, and await a shower of rain to wash them down to the river.

This state of things has long been notorious, and various attempts have been made to determine the question of the remedy to be applied. As long ago as 1866 an engineer from Hereford, Mr. Curley, was called in to see what was best to be done for the sewerage of the town. No decision was come to on that occasion.

Again in 1874, after a faithful report from the Medical Officer of Health, Mr. Curley was a second time asked to advise the authority as to sewerage and water supply. He advised the pumping of the water of the River Lugg by water-wheel power to the top of a neighbouring eminence called the Warden, to be thence distributed by gravitation. He also planned a system of sewerage for the town. Application was made to the Local Government Board to sanction a loan for the purpose of carrying out this plan. An inquiry was held by Lieut.-Col. Cox, R.E., who reported that there were doubts as to the purity of the river water in the summer time, when large numbers of sheep were washed in the river above the town, and that it was doubtful if the proposed water-wheel power would always be available. Objection was also made to the proposed plan of sewerage.

It was next proposed to impound the rainfall of a certain limited drainage area in a reservoir in a hollow of the hills above the town. This scheme, however, was not carried out.

Subsequently Mr. Curley proposed to take, instead of the water of the Lugg, the water of a tributary stream (Colebrook) which is believed to be free from pollution, and to purchase the right to the water mill, which could then be used at all seasons to pump the water to the top of the Warden Hill. This plan, if the negotiation regarding the mill could be successfully carried, would probably be free from objection; but I gathered that there were doubts as to the success of the negotiations for the mill.

Another proposal has recently been made, to force water from another streamlet to the top of the Warden Hill by the aid of a compound hydraulic ram, using for that purpose a fall of less than a foot, which might be obtained on the River Lugg above the mill, and therefore not in any way interfering with the mill-rights. This plan would well deserve the attention of the Sanitary Authority, if the plan for using the mill should have to be abandoned.

It now behoves the body on whom the sanitary charge of Presteigne has newly



devolved to take steps to bring to a decision this long delayed question of water supply and drainage for Presteigne.

Sanitary administration.

With regard to the past administration of the Sanitary Acts in the Knighton Union, I think it is my duty to draw attention to the long course of delay and neglect on the part of the Sanitary Authority in dealing with the wants of their district.

It cannot be said that the Sanitary Authority have been ignorant of those wants. Since 1872 they have received reports from their Medical Officers of Health in which the necessity of better water supply, better drainage, better protection of dwellings from damp, and other requirements were plainly set forth. Those reports came to the notice of the Local Government Board, and they from time to time have made inquiry of the Sanitary Authority as to the steps that had been taken or were proposed for the improvement of the district. Hitherto the answers to these inquiries have been wholly unsatisfactory.

To take a single case, that of the village of Beguildy. In July 1874 the Medical Officer of Health (Mr. Covernton) reported "In Beguildy Village the water supply was contaminated by sewage containing the excretions of typhoid patients during the fever epidemic. During the present summer water has been carted from a pure source half a mile away (viz., the River Teme). A pure water supply might be obtained at little expense from the adjacent hills. There is no drainage in the village of Beguildy, and, until lately, no privies of any description. The sanitary improvements ordered here have only been partially carried out. The water supply is bad, and will remain so until it is obtained from sources above the churchyard and neighbouring farm premises."

During the next two years the Board made inquiry, seven times repeated, as to the steps which the Rural Sanitary Authority proposed to take. To these inquiries the Guardians either returned no answer at all or returned answers which showed that nothing of any value was being done.

On April 21, 1876, the Board having received the Annual Report (for 1875) of the Medical Officer of Health, wrote :—"From the report of Mr. Covernton now before the Board, it would appear that drainage is still wanting, and water supply impure in many parts of the district; that nuisances abound, some of which have been specially reported, without any steps being taken for their abatement; that over-crowding exists; that some houses are unfit for habitation, and that a great number are without privy accommodation. Having regard to the general condition of the district, and to the mortality which has already occurred from diseases which almost invariably owe their prevalence to the neglect of proper sanitary measures, it appears to the Board that the Rural Sanitary Authority are incurring a very grave responsibility in neglecting to perform the duties which the Legislature has imposed upon them."

Further information was requested in six weeks' time. This request was repeated three times.

On October 14, 1876, the clerk wrote that instructions had been given to the Inspector of Nuisances to give orders for the removal of all nuisances, and for the provision of privies, to the occupiers and owners of premises, where necessary; that at the last meeting of the Authority proceedings were directed to be taken against those parties who had neglected to comply with such orders, and that the Authority had also requested their Inspector of Nuisances, with the assistance of the Medical Officer of Health, to furnish them with a special report of the water supply of the village of Beguildy, and the best means to obtain a pure and sufficient supply.

(This preliminary step of ordering a "special report" is taken, be it observed, more than two years after the want of good water at Beguildy had been brought pointedly to the notice of the Sanitary Authority.)

On October 26th, 1876, the Board requested information as to further steps taken in regard to the water supply of Beguildy. This request was repeated on January 8th, 1877.

On February 19th, 1877, the clerk writes: "With respect to the water supply of the village of Beguildy, the Sanitary Authority have on several occasions discussed the advisability of constructing some works for such supply, and for this purpose have examined two or three plans submitted to them by their Inspector of Nuisances, but they do not consider it advisable to cause any such works to be made."

In March 1877, the Medical Officer of Health reports that "the condition of the different villages in the [Beguildy] district is almost exactly the same as reported last year, no improvements having been effected either as regards drainage or water supply."

At the present time, after four years of trifling with this question, on which human lives depend, the Sanitary Authority leave it as it was when their attention was first drawn to it by their officers.

The action of the Authority appears to have been limited to orders for removing the most conspicuous nuisances, for providing privies in some parts of the district, for laying slop drains in one or two villages, and for troughing the eaves or excavating earth from the backs of some houses which had attracted attention by special incidence of fever; small measures, which the owners or occupiers of property were expected to carry out, and which did not cost the Authority much trouble or much expense. On looking through the journal of the Inspector of Nuisances, it is seen that, of the cases of sanitary defect which were reported to the Authority and were by them ordered to be remedied, several were allowed to continue unremedied, and the orders allowed to lapse.

There are perhaps some grounds for hoping that improvement is about to proceed more rapidly in the district. In the first place, the recent enlargement of the Knighton Union has altered the constitution of the Board of Guardians; and, in the second place, there appears to be a better disposition on the part of some of the chief landowners to comply with the requirements of decency and health, and to remove the scandal of unwholesome habitations from their several estates.



## KNIGHTON URBAN SANITARY DISTRICT.

The Knighton Urban Sanitary District is so much of the parish of Knighton as is included in the contributory parliamentary borough of Knighton. This is very little more than the town of Knighton. The population in 1861 was 1,655, in 1871, 1,743. Since the construction of the railway Knighton has risen in prosperity, and the population is now estimated at 2,000. Description.

The Medical Officer of Health, with a salary of 10*l.*, is C. J. Covernton, Esq., who also holds a portion of the rural district. The Inspector of Nuisances, Mr. H. Anthony, has a salary of 39*l.* Both are under the regulations of the Order of the Board of November 11th, 1872. The town stands piled on a steep hill of gravel, jutting out from the main range on the south side of the River Teme, in a fork between the narrow valley of the Teme and the deep dingle of one of its southern tributaries the Wilcome Brook. The streets are mostly very steep and narrow and confused in plan, apparently inheriting this character from olden times, when for sake of protection the dwellings were clustered close around the castle, of which only the mound remains at the present day, at the highest point of the town. The principal street is wider than the rest, and forms part of the high road along the Teme valley, leading from Ludlow, and also from Presteigne to Newtown in Montgomeryshire. Knighton stands upon the line (still plainly traceable) of Offa's Dyke, and is known in Welsh by the name of Tref clawdd (Dyke-town).

Along the principal street, and in streets that have been recently built, the houses are of good character. As one climbs the narrow rough-paved trough-like streets, the dwellings are more cramped and closer huddled and less well built, until at the top of the town there is found a semicircle of most miserable hovels, closely investing the old castle mound, half buried in the castle ditch, and backed into the castle bank, damp, ill-ventilated, unwholesome, a disgrace to the town. On the side of the hill sloping to the Teme are some newer streets of well constructed houses. On the other side, which falls steep into the ravine of the Wilcome Brook, there are several rows of low class dwellings terraced in the steep hill side, and presenting all the bad features of dampness, insufficient ventilation, and close contact with filth which naturally belong to dwellings so situated. This part of the town is known as the Cwm.

The steep position of Knighton, and the porous nature and great depth of the gravel on which it stands, have made it useless to sink wells, except in the lowest parts of the town. Even there they are no longer used. Within the memory of the oldest inhabitants, the town was supplied with water from a reservoir within the castle banks, to which it was pumped from the Wilcome Brook by a water-wheel. At a later period water was brought in leaden pipes from a spring, known as the Garth Spring, in the side of the hill which rises behind the town. Water supply.

In 1853 a comprehensive scheme of sewerage and water supply was carried out. An attempt was made by the engineer to obtain more water from the Garth Spring by blasting deeper into the rock. The result was that half the spring was lost, finding its way probably through hidden fissures that the blast had opened. It then became necessary to supplement this supply from another source, and three or four good springs were chosen on the opposite side of the Wilcome dingle, a covered brick gathering reservoir (known as the "Frydd" Reservoir) was built in the dingle side, at a level about 30 feet above the top of the town, and iron pipes were laid to carry the water obliquely across the dingle into the town. This main received also in the bottom of the dingle an additional supply from a spring called Jackets Well, which rises by the side of the Wilcome Brook at a point some way higher up the dingle, about the level of the middle part of the town. A valve on this branch prevents regurgitation under pressure of the head of water in the Frydd Reservoir.

Still more recently the supply to the Frydd Reservoir has been largely increased by an auxiliary from another dingle. This work was finished last year.

All these sources, there is every reason to believe, are good and pure and safe from pollution. It would be difficult indeed to find a town enjoying greater advantages in regard to sources of water supply than Knighton.

There are drawbacks, however. First, the water acts very corrosively upon the iron pipes and forms an irregular nodular deposit on their internal surface, which in the course of years greatly diminishes their calibre and seriously retards the flow of water through them by the enormous friction to be overcome. The town surveyor showed me a 2½ inch pipe recently taken up, of which the average free diameter was little more than one inch. Moreover, the pipes originally laid were smaller than they ought to have been. Second, the multiplicity of the sources of supply is a hindrance to regularity of service. The Garth Well, being the highest, supplies an upper quarter of the town, but in dry seasons this supply is known to fail, and then connexion has to



be opened with the Frydd supply. All the rest of the town, high and low, is supplied from the main in the Wilcome dingle, which has two heads, a high head at the Frydd Reservoir, and a low head at the Jackets Well. Now as long as the pipe from the Frydd Reservoir is open, the valve on the Jackets pipe is shut by the pressure due to the greater height of the Frydd Reservoir, and the Frydd water goes to the whole town, high and low, except the portion supplied from the Garth, and for the greater part of the year the Frydd Reservoir is equal to this demand, and the Jackets water overflows uselessly above the valve; but in dry seasons the Jackets water is wanted to supplement the Frydd—they cannot both flow at the same time; it is necessary to stop the Frydd pipe to allow the Jackets water to flow, and the Jackets water will not reach the higher parts of the town. At these seasons, therefore, the supply becomes intermittent; different quarters of the town have to be supplied in turn. When it is desired to throw the water to the upper town, the branch main to the lower town is shut off, for sake of economy of supply. When the lower town is to be supplied, the branch main to the upper town is shut, the Frydd pipe is shut, and the Jackets water occupies the main, and supplies the lower town while the Frydd Reservoir is refilling. All this trouble is owing to there being only one main pipe for the water from two distinct sources, one high and the other low. What is wanted (as the town surveyor, Mr. H. Anthony, has long ago pointed out to the Local Board,) is a collateral main to lead the water from Jackets Well to the lower town, without interfering with the main from the Frydd Reservoir, and leaving the Frydd water for the sole use of the upper town. At the same time there should be optical connexion between them, for the sake of increased pressure that might be useful in the lower town for extinction of fires. I believe the Local Board contemplate carrying out this improvement.

The present intermittent summer service involves the danger of foul air being drawn into the water-pipes at an open tap in a watercloset (the surveyor knows of one or two such taps in direct connexion with the main), or at a bad joint or crack or corroded place in a pipe in filthy ground. Such an accident might poison the whole town, or a large section of it.

Sewerage.

At the same time with the waterworks in 1853 a system of earthen pipe sewers was laid down, draining the whole of the town, except some lower rows of cottages in the Cwm. No special provision exists for flushing the sewers, reliance being placed on their steep fall, and on rain water and waste water from the dwellings, to keep them clean. The surveyor assured me that whenever he had had occasion to examine the sewers he had found them quite clean.

Neither is there any special provision for ventilation of the sewers. Some of the rain pipes are stated to communicate directly with the sewers, and these perhaps serve to relieve the pressure of gas in the sewers, though they can do little or nothing to dilute the gas and neutralise its dangerous properties. The surveyor acknowledges that where an opening is made in the sewer the smell is very bad.

The outfall of the main sewer is in the bed of the River Teme, a short distance below the town. It is always covered by the stream, and in flood time, when the river rises several feet, the sewage and sewer gas must be forced back a long way in the lower and more nearly level reach of the main sewer, and much undiluted sewer gas must make its escape somewhere in the town, perhaps at the top of a rain pipe near a bedroom window, perhaps from an untrapped or ill-trapped house drain.

Privies and waterclosets.

There are now a good many waterclosets in connexion with the sewers, and in all but two or three instances (mentioned above in connexion with intermittent water-supply) these closets are provided with separate service cisterns. These ought to be made a necessary condition of the use of the town water for closet purposes. Closet-taps in direct connexion with the water-mains ought to be strictly prohibited.

The poorer dwellings, with few exceptions, have common privies with brick-walled or unwallled pits. Among the narrow terraced rows of cottages in the Cwm there are frequent instances of privies too close to the dwellings, of privies too few for the families that use them, of cesspits from which the filth leaks out on the lower side and makes its way down the bank from ledge to ledge. Filthily kept piggeries are found here close against house walls. Here also the want of drainage gives rise to slop nuisances, and refuse of all kinds is thrown out on the steep bank below the dwellings and scatters itself down the slope. The Cwm stands in great need of improvement, not only in respect of structural provision, but also in the matter of strict daily inspection and cleansing. It is the filthiest part of the town.

Refuse removal.

There is no public system of scavenging beyond mere street cleaning. Removal of refuse is left to the occupants. They wait until they receive a notice from the Inspector of Nuisances. Everything, therefore, depends on the vigilance and



pertinacity of this officer, and in this respect the state of some parts of the town, especially the Cwm, gives evidence of insufficient attention. But why should the Authority allow refuse to remain accumulating among the dwellings till it becomes a positive nuisance, and the act of removing it causes even more nuisance than its presence? Why not establish a system of frequent and regular public scavenging which shall prevent any nuisance arising?

There are slaughter-houses in the town which, however carefully kept, can scarcely fail to be nuisances, situated as they are in the midst of dwellings. In at least one case the nuisance is aggravated by the presence of pigs kept beside the slaughter-house to be fed on the offal. It has been proposed to establish a public abattoir outside the town. Slaughter-houses.

The churchyard is full, and has been reported to the Local Board by the Medical Officer of Health. It would be well if some safer place of interment were used instead. Burials.

There is no hospital or other place at the command of the Urban Sanitary Authority that could be used for the isolation of cases of contagious disease. Neither have they any ready means of disinfecting infected clothes, bedding, or other articles. Hospital accommodation.

The health of the borough at the present time is reported by the Medical Officer of Health to be good, but the time is remembered, before the introduction of the present water supply, when Knighton suffered severely from fever, probably enteric fever. It would be difficult to obtain the requisite data for an accurate estimate of the death-rate for any period earlier than 1874, because the borough does not coincide with any special registration area. From data furnished to me by the Medical Officer of Health it appears that, allowing for probable increase of population, and distributing the deaths in the workhouse among the several districts in proportion to their population, the death-rate in 1874 was 16·2 per 1,000 living, in 1875 it was 16·3, in 1876 it was 16·4, and in 1877 it was 19·5. In the last year only one death from zymotic disease occurred in the urban district, a case of enteric fever sent into the workhouse from the rural district. In 1876 there was one fatal case of enteric fever in the Cwm, imported from South Wales; fortunately the disease did not spread further. In that year also measles, diphtheria, and whooping cough caused one death each. There was also one death from enteric fever in 1875, and two in 1874; and in each of those two years there was a death from whooping cough. These deaths from zymotic disease are sufficiently numerous, in proportion to the population, to call for the most careful attention to the cleanliness of the town. Health.

For the future, I think there is good reason to regard the sanitary prospects of the borough of Knighton as very promising. The water supply, drainage, and scavenging can be made perfectly efficient at comparatively small cost, for which the near expiration of the period of repayment of the loan incurred in 1853 will leave the Local Board in good financial position. The Local Board themselves are earnestly desirous of making the sanitary condition of the town as good as possible.

March, 1878.

HUBERT AIRY.

## RECOMMENDATIONS.

### KNIGHTON URBAN SANITARY DISTRICT.

1. Constancy of water service to all parts of the town should be secured as soon as possible. The works now contemplated by the Urban Authority, under competent engineering advice, appear well calculated to obtain that result.

2. An engineer should be consulted as to the best mode of draining that portion of the Cwm which is now undrained. The existing sewers should be properly ventilated. For this purpose it would probably be found sufficient, in the wider and less crowded parts of the town, and along the lower course of the main sewer towards its outfall, to place numerous ventilation gratings at the surface; but in the higher parts of the town, where the streets are narrow and the dwellings crowded, and especially in closed courts, it might be found needful to ventilate the branch sewers by shafts or pipes of large calibre carried up to a height of several feet above any neighbouring windows.

Careful examination should be made of different parts of the sewers to see if they contain any deposit due to insufficient flushing; and if such should be found, advantage should be taken of the (expected) increased water-supply to provide the means of flushing the sewers.

Advice on these points is given in Mr. Rawlinson's "Suggestions as to Main Sewerage, Drainage, and Water Supply," of which the Sanitary Authority already possess a copy.



3. The speedy and regular emptying of privy cesspits and removal of refuse of all kinds from the neighbourhood of human habitations should be secured. The best plan would be for the Sanitary Authority to have the actual work done by servants of their own, or else by some one who will contract to do it. It should not be left to the tenants, for experience shows that they will not do it efficiently, even under strict inspection.

It would be well to place strong iron dust-bins in the places where refuse nuisances most commonly occur, and require the neighbouring cottagers to put their dry refuse nowhere but in those bins.

Privy cesspits, if permitted to remain, should be made water-tight, covered and ventilated; rain and surface drainage should be excluded from them. Privies close to dwellings should be removed or else adapted for earth or ash closets, or (if within reach of a public sewer) for waterclosets.

On these points further information will be found in the office report "on certain means of preventing excrement nuisances in towns and villages." Where the contents of any watercloset, privy, or cesspool are found overflowing or soaking therefrom the Sanitary Authority should put in force the provisions of section 47 (3) of the Public Health Act, 1875.

4. Nuisances of all kinds should be kept under more frequent and rigorous inspection.

5. Houses that are unfit for human habitation should be dealt with under section 97 of the Public Health Act, 1875.

6. The Sanitary Authority should take into consideration the establishment of a public abattoir outside the town, with a view to closing the slaughter-houses in the town.

7. The Sanitary Authority should take steps to procure a suitable building, to be used as a hospital for the reception and treatment of any cases of infectious disease. Perhaps this might be most conveniently done in concert with the Knighton Rural Sanitary Authority.

The district should possess suitable appliances for disinfection, and in connexion with it there should be an ambulance van and a mortuary.

#### KNIGHTON RURAL SANITARY DISTRICT.

##### A. For the town of Presteigne.

(1.) The Rural Sanitary Authority should lose no time in taking steps to procure an ample supply of pure water.

In selecting the source from which the water is to be taken, it should be remembered that the water of rivers and streams is likely to receive impurities from surface drainage; water gathered from the surface of any rainfall-area is exposed to the same objection in proportion to the extent to which manure has been employed on that area; the safest water is that derived from springs.

Skilled engineering advice should be taken as to the best means of conveying water to the town.

(2.) The town of Presteigne should be properly and completely sewered, under skilled engineering advice. The Board have issued "Suggestions as to Main Sewerage, " Drainage, and Water Supply," in which information on the above points will be found.

(3.) The Sanitary Authority should consider how best to remedy the noxious state of the privies and cesspits and mixens in Presteigne.

Privies or cesspits from which fluid soaks into the soil in the neighbourhood of dwellings ought to be regarded as nuisances which are likely to recur, and therefore ought to be dealt with under sections 95 and 96 of the Public Health Act, 1875. It would be desirable that the privies should be converted to earth-closets or pail-closets, or (assuming sewerage and water supply) to waterclosets.

Further information on these matters will be found in the office report "on certain means of preventing excrement nuisances in towns and villages."

Removal of refuse should be managed by servants of the Sanitary Authority or by a contractor, and should not be left to the tenants themselves.

(4.) Considering the importance of Presteigne, and its distance from Knighton, the Sanitary Authority ought to have at command, in or near Presteigne, some suitable building (if only a cottage) which should be kept in readiness to receive the earliest cases of any contagious fever that might occur in this part of the district.



B. For the rest of the Rural District.

(5.) The Sanitary Authority should take steps, without any more delay, to procure a proper supply of pure water for the numerous villages and hamlets which have at present only an inconvenient or impure supply. The following places deserve especial attention: Lower Llaithdy, Llanbadarnfynydd, Llanbister, Llanfihangel Rhydithon, Beguildy, Lloyney, Bucknell, besides many smaller places. At Llandewy, I believe, the landowner is taking steps to procure a proper supply.

To most of these pure water can be brought in pipes from the hills at comparatively small cost.

(6.) Every house standing alone ought to have a proper privy. Where two or more houses stand together there should under no circumstances be less than one privy to every two houses.

Privies ought to be removed to a safe distance from any dwellings. Where, owing to limited space, this cannot be done, the privies ought to be converted to earth-closets or pail-closets, and kept under special inspection to prevent any nuisance arising. (Sections 95 and 96, or 40 and 41, of the Public Health Act, 1875.)

The Sanitary Authority will find information on these matters in the office report mentioned above (3).

(7.) Dwellings which are so damp (from defective roofing or want of eaves-troughing, or from being sunk below the level of the soil outside), or so dilapidated, as to be unfit for human habitation, should be dealt with under section 97 of the Public Health Act, 1875.

(8.) The provisions of the Public Health Act, 1875, sections 91 et seq., should be more strictly enforced, for the removal of nuisances arising from privies, cesspools, house slops, kitchen refuse, pigstyes, farmyard drainage, or any other filth. The Rural Sanitary Authority, in every case in which an order has been made to abate or prevent the recurrence of a nuisance in their district, should see that such order is effectually carried out.

(9.) It is desirable that the Authority should, to a much greater extent than hitherto, give effect to the recommendations of their Medical Officers of Health.

(10.) The Rural Sanitary Authority should have at command some suitable place for the reception of persons, other than paupers, suffering from any contagious fever.

Perhaps it would be best to combine for this purpose with the Knighton Urban Sanitary Authority.

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